Optional Uniform Dwelling Code (UDC) Makeup and Combustion Air Worksheet (April 2001)

Project Address _____ Completed by: _____ Tel. _____

Background: The UDC applies to all one and two family dwellings built since June 1, 1980. Section Comm 23.02 of the UDC requires that outside **makeup air** be supplied to balance mechanical exhaust ventilation, including required bathroom fans, so that adequate air change occurs, without backdrafting of open combustion heating appliances. Section Comm 23.06 of the UDC requires that adequate **combustion air** be supplied to heating appliances for complete fuel combustion and flue gas venting purposes, which should minimize carbon monoxide hazards. This worksheet demonstrates compliance with both requirements.

If your dwelling does not have any open combustion appliances, then you do not have any **combustion air** requirements and, by code, can rely upon infiltration through building cracks for **makeup air**. Open combustion appliances are those which use air from within the dwelling for combustion.

Notes: Typical appliance values are given in the tables, however use actual values if known. **Round pipe** has the following areas: 3" dia. pipe - 7 sq in, 4" - 12 sq in, 5" - 20 sq in, 6" - 28 sq in, 8" - 50 sq in, 10" - 79 sq in, 12" - 113 sq in. **Opening Restrictions:** If louvers or screening is provided on an opening, then multiply its area by the following factors: 1.0 for 1/4" hardware cloth, 0.8 for 1/8" screen, 0.75 for metal louvers, 0.5 for metal louvers and 1/8" screen, and 0.25 for wood louvers.

A. Makeup Air - Complete the following table for exhaust fans, but not recirculating, whole house fans, attic fans or inlets of balanced ventilation systems.

Intermittent Exhaust Fans	Typical Exhaust CFM	OR Actual CFM	Number	Total (cfm)
Bathroom fan (min. 50 cfm)	75		x	
Resid. kitchen range hood	180		x	
Downdraft range exhaust	400		x	
Electric clothes dryer	175		x	
Gas clothes dryer	150		x	
			SubTotal	
			Intermittency Adjustment Factor	X .40
			Adjusted Total	
			Any constant exhaust fans without dedicated makeup air	+
			Grand Total	

You can provide makeup air via the following methods (check appropriate boxes). Note that openings or ducts shall be provided between the source of the makeup air and the exhaust fans.

- **Intake fans with a capacity equal to the Grand Total above**. If ducts are connected to the fan, the fan capacity shall be appropriately adjusted.
- **Openings to the outside, ducted to the return plenum of the furnace** to provide tempering and distribution. Multiply the Grand Total by the appropriate factor for louvers or screening to obtain the gross makeup air required:

_____ (Net Grand Total Makeup Air Required) ÷ _____ (Opg Restr. Factor) = _____ (Adjusted Makeup Air Req'd)
The calculated capacity for round intake duct is: 3" - 38 cfm; 4" - 69 cfm; 6" - 157 cfm; 8" - 279 cfm (Circle planned size).

Section Comm 22.14 requires outside makeup air openings to have manual shutoff means and automatic or gravity dampering means for periods when no makeup air is required. Because of this dampering requirement, you may **not** use makeup air openings for combustion air openings, which are prohibited to have dampers.

B. Combustion Air (Note that appliance manufacturer requirements may be more restrictive.)
There are several methods of providing combustion air, of which you will choose one for each group of appliances in a common space. First, complete the table **for open combustion appliances** on the next page to determine if you can comply with method 1, below, which allows the air to be drawn from inside the dwelling. Otherwise, choose another method from the next page.

1. Inside Air (Discontinuous Vapor Barrier): Allows combustion air to be drawn from an inside space if the building has a discontinuous vapor barrier, as is permitted at box sills by s. 22.22. The space shall provide a room volume of at least 50 cubic feet per 1000 btu/hr combined input rating of all open combustion appliances in that space. **Room Interconnection**: An inside space may include several rooms if connected with **high and low openings**, with each opening providing one square inch of clear opening per 1,000 btu/hr input rating, but not less than 100 square inches each. Remember to apply the above Opening Restriction Factors for louvers on the openings.

Sq. In Req'd at Input/1,000: _____ (Min. 100 sq. in.) ÷ ____(Opg. Restr. Factor) = _____sq. in. **each opg**;

Appliance	Appl. Group Num-ber	Typical BTU/hr Input	Actual BTU/hr Input	Total BTU/hr in Each Numbered Group of Appliances That Share a Space	Room or Interconnected Space Volume	Room Volume Divided by [Total BTU/hr in Room ¸ 1,000]*
Furnace Gas Other		100,000		Appl. Group 1		
Water heater Gas Oil		50,000				
				Appl. Group 2		
Gas clothes dryer		35,000				
Gas fireplace		50,000		Appl. Group 3		
Gas range		65,000				
Wood stove or fireplace (Input per Cu. Ft of firebox capacity)		100,000				

***If any room, or interconnected group of rooms, provide less than 50 cu ft per 1,000 BTU/hr of all appliances within, per the last column of the table, or the dwelling has a continuous vapor barrier, then choose one of the appropriate methods below. Enter the appliance group number in front of the applicable method. You can skip to Method 3 or 5 if the room is small and isolated.**

2. Inside & Outdoor Air (Continuous Vapor Barrier): If dwelling has a continuous vapor barrier, and therefore cannot use method 1 of taking all air from inside, but per the above table has a room volume of at least 50 cubic feet per 1000 btu/hr combined appliance input rating, then provide supplemental outside air via a single, direct or ducted, exterior, high opening, sized at one square inch per 5,000 btu/hr combined input rating.

Appl Group# _____

Exterior Opening:

Sq. Inches Required at Input/5,000: ____ ÷ ____(Opg. Restr. Factor) = _____sq. in.; Planned Opg. Dim. _____

Room Interconnection:

Sq. In Req'd at Input/1,000: _____ (Min. 100 sq. in.) ÷ ____(Opg. Restr. Factor) = _____sq. in. **each opg**;

3. Single Outdoor Opening (Gas Appliances Only): If serving only gas appliances, then provide outdoor air via a single, direct or ducted, exterior, high opening sized at one square inch per 3,000 btu/hr combined input rating, but not smaller than the combined cross sectional areas of the appliance flue outlets in that space.

Appl Group# _____

a. Sizes & areas of flue outlets: _____ Total flue area: _____ sq in.

b. Net Sq. In. Required at Input/3,000: _____ sq in

Greater of a. or b.: _____ ÷ _____(Opg. Restr. Factor) = _____sq. in.; Planned Opg. Dim. _____

4. Prorated Inside Air Credit Plus Outdoor Air: Calculate the pro-rated credit for an inside space that partially meets method 1, and then make up the difference by pro-rating the outside combustion air otherwise required by method 5. **Example:** If the inside space provides only 25 cubic feet per 1,000 btus (**per last column of table above**), or half of the size required by method 1, then the additional direct or ducted outside combustion air, as calculated by method 5 can be reduced by one half.

Appl Group# _____

Pro-rating credit: **100%** - [_____ (Actual room vol. per 1000 BTU/hr) x 2)] = _____

5. Two Outdoor Openings: Provide outdoor air via high and low, direct or vertically ducted, exterior openings, each sized at one square inch per 4,000 btu/hr combined input rating; or via horizontally ducted openings, each sized at one square inch per 2,000 btu/hr combined input rating.

Appl Group# _____

Direct or Vertical Ducts: Sq In Required at Input/4,000: _____ sq in x _____ (Credit from 4.) = _____ sq in.

Horizontal Ducts: Sq In Required at Input/2,000: _____ sq in x _____ (Credit from 4.) = _____ sq in.

Net Sq. Inches Required: _____ ÷ ____(Opg. Restr. Factor) = _____sq. in.; Planned Opg. Dim. _____